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With regard to the Miocene fossils, especially the Cetacean vertebrae, settled into the broken surface of the Greensand, I did not enter into detail as to a wider distribution of these remains. It was not necessary for me to open out another series of observations beyond my immediate purpose. Let it suffice to say, however, that these remains are not confined to the surface of the Greensand, but that other specimens of the same were found by my own efforts at various points beyond this section of the bluffs.

I cannot admit that "each season presents new phases and unsettled local stratigraphic complications" in more than a superficial sense. The body of the promontory is not broken up, although every storm does abstract from or disturb a part of its face. Photographs in my possession show various changes which have been made from time to time in the ends and sides of the beds there exposed, but not a dislocation of the main body of the ridge. They confirm also the observation that several buttresses of the "Raritan" resting upon the lead-colored clay extend outward in original order from the ridge, while the intervening ones flanking the gullies are built of overthrown strata.

The so-called faulting is of a type common to clayey and sandy terranes, such as we are familiar with in the tide-water region of Maryland, where atmospheric agents, especially frost and thawing, open cracks somewhat parallel to the brow of a bluff. These cracks gape wider and extend deeper as the power of the sun increases, and at length cause a down-slide or fall when the beds become weakened by saturation with rain-water. Such fissures are also opened more widely and deeply by the dropping into them of coarse sand and pebbles, which spread apart by freezing and thawing. A notable example of this kind occurred to my observation on the projection of a heavy body of massive granite on Jones's branch, near Baltimore, where a fissure caused by freezing and thawing was gradually opened by an influx of sand, but which burst apart with almost explosive force one afternoon in the spring, following a season when numerous quartz pebbles had fallen into the crack from the overlying soil. The same phenomenon may be seen in the broken masses of granite which occur in places along the shores of Fisher's Island, near New London, Conn.

Several years ago, when many of the trees had been cleared from the brow of the cliffs of Potomac clay, along the shores of the Patapsco River, fissuring took place at intervals near the borders of these hills, and downthrows from the front of the bluffs were of common occurrence. In connection with such movements, and especially following a season of heavy autumnal rains, large cavities were rent in the cracking clays, some of which were large enough to admit a moderately large boy.

An example of the Gay-Head type of slipping, crushing, and swelling out, on a somewhat smaller scale, may be seen adjoining Sullivan's Cove, at the north-western end of Round Bay, Severn River, Md., and several of the same features, on a grand scale, may be studied next the face of Maulden's ridge, on the North-east River, Md.

The type of cutting and downthrow of the bluffs on the Vineyard Sound side of Gay Head is far more complex and varied than that of the south-west, or Atlantic, side. On the former the diagonal stroke of a surf from the south-east would cut deeper than the straight forward blow of the Atlantic on the south shore, and accordingly would be more effective in undermining the face of the terrane. The effects of those two methods of erosion are well shown on the opposite sides of this coast.

With regard to the aggregation of the non-marine lower portion of this series of formations, it seems probable that they were begun in the rocky hollows along the whole Atlantic coast from Maine to Cape Hatteras; that rapid currents carried large accumulations of broken stone and the elements of the crystalline rocks many miles out into a shallow sea, which was later barred out by the thick accumulations of these deposits, that thus a series of almost closed sounds was connected with the border of the continent, and that these sounds, extending in a sinuous north-east line, were the places of deposition of all the beds and strata which we now recognize as the Potomac, Albirupian, and the Raritan formations.

It has been my pleasure to read carefully both of Professor

Shaler's accounts of Gay Head, and to recognize the many good statements that he has made regarding particular features of the region; but I fail to see that he has given an adequate account of the real structure of the promontory, of its relations to other parts of the island, or of its relations to the similar deposits in Massachusetts, Rhode Island, and Long Island. P. R. UHLER.

Baltimore, Md., Dec. 19.

The Reticulated Structure of Protoplasm.

AFTER I had read the proof of the article on the reticulated structure of human red blood-corpuscles published in *Science* for Sept. 16, 1892, I received a book recently issued in Paris, and entitled "La Cellule Animale, sa Structure et sa Vie, Étude Biologique et Pratique, par Joannes Chatin, Professeur adjoint à la Faculté des Sciences de Paris, Chargé du Cours d'Histologie à la Sorbonne, Membre de l'Académie de Médecine." In this delightful treatise, which brings the knowledge of the animal cell to the present time, there are one or two statements in regard to the structure of protoplasm which I should have liked to quote in the paper mentioned, but as that is now impossible, I have asked the editor kindly to allow me to call attention to the following:—

C'est seulement en 1880, à la suite des recherches de Heitzmann, de Fromann et surtout des publications de Hanstein, que l'on commence à modifier la conception générale du protoplasma, pour le considérer, non plus comme une masse indifférente, mais comme une substance structurée.

Cette interprétation recontra une assez vive opposition. Il est des esprits scientifiques qui tiennent à demeurer constamment fidèles aux principes dont ils se sont inspirés dès leurs premières études et qu'ils ne consentent que difficilement à abandonner. . . .

On doit distinguer dans le protoplasma deux parties: l'*hyaloplasma* et le *paraplasma* (Fig. 49).

L'*hyaloplasma* est une substance fibrillaire, hyaline, réfringente, formant un réseau au milieu d'une substance fluide, moins réfringente, qui est le *paraplasma*. Qu'on se représente une éponge à travées très ténues et contractiles, plongée dans une substance visqueuse et granulée qui remplirait ses cavités. Cette comparaison donne une idée grossière, mais assez exacte, de la masse protoplasmique prise dans son ensemble.

Elle paraît homogène si les mailles de l'*hyaloplasma* sont uniformes et qu'on fasse usage d'un faible grossissement. C'est ainsi que le protoplasma avait été étudié durant longtemps, et l'on s'explique d'autant mieux l'erreur dans laquelle on demeurait à l'égard de ses parties constitutives, qu'elles ne se distinguent en général qu'après l'intervention de certains réactifs comme l'acide osmique. Cependant l'histologie zoologique permet de les observer directement, et j'ai déjà eu l'occasion de mentionner à cet égard l'exemple des cellules glandulaires de la Testacelle.

La structure réticulée du protoplasma s'observe dans les cellules amiboïdes comme dans les éléments à forme définie; l'étude des globules sanguins des Invertébrés (Vers, Crustacés, etc.), permet de constater aisément ce fait, d'abord révoqué en doute par des observateurs qui limitaient leurs recherches aux éléments de quelques animaux supérieurs.

ALFRED C. STOKES.

Trenton, New Jersey.

Auroral Displays.

In answer to Professor Swift's inquiry in *Science* of Dec. 9, I will say that I saw "that memorable spectacle" in the winter of 1834 or 5 when "the snow and the sky suddenly assumed," in the evening, "a bright crimson red." It is one of the most distinct things in my remembrance. I was then well along in my "teens," but had not then undertaken very extensive meteorologic observations and records.

When Dr. Swift speaks of the aurora of July 16 last as "the grandest auroral display of the century," does he take into account the great aurora of August, perhaps, in 1859, when the whole sky was covered with beautifully colored streamers? A fine corona appeared, the display lasted from evening until morning twilight, was repeated less brilliantly during the following night, and with intermediate disturbances of the telegraph lines and of the mag-